

CLAIMS

1. A process for recovering valuable metals from laterite ores and concentrates that are contaminated with iron, which process includes the steps of:
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- (a) reducing ferric ions to ferrous ions in a leach liquor containing a valuable metal and iron in solution using a suitable reductant, the leach liquor being obtained by processing laterite ores or concentrates of the ores that contain the valuable metal and are contaminated with iron;
- 10
- (b) neutralising the liquor to reduce the free acid concentration in solution to levels suitable for nickel precipitation; and
- 15
- (c) precipitating the valuable metal using the reductant and seed particles under process conditions, including one or more of seed particle size, seed composition, and temperature, that are selected to maximise nickel precipitation and to minimise iron precipitation.
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2. The process defined in claim 1 wherein the reduction step (a) includes reducing ferric ions to ferrous ions using the reductant in the presence of 40-90 g/l free acid.
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3. The process defined in claim 1 or claim 2 wherein the reductant is a gaseous reductant.
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4. The process defined in claim 3 wherein the gaseous reductant is H_2S .
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5. The process defined in any one of the preceding claims wherein the neutralisation step (b) increases the pH of the solution to 2.

5 6. The process defined in any one of the preceding claims wherein the neutralisation step (b) maintains iron in the ferrous state.

7. The process defined in any one of the preceding
10 claims wherein the valuable metal is nickel.

8. The process defined in any one of the preceding claims wherein the valuable metals are nickel and cobalt.

15 9. The process defined in any one of the preceding claims wherein the laterite ores are ores that contain nickel in a chlorite mineral phase.

10. The process defined in any one of the preceding
20 claims wherein the process conditions for the precipitation step (c) include operating at a partial pressure of the gaseous reductant of less than 60 psi.

11. The process defined in claim 10 wherein the gas
25 partial pressure is less than 40 psi.

12. The process defined in claim 11 wherein the gas partial pressure is less than 30 psi.

30 13. The process defined in claim 12 wherein the gas partial pressure be less than 25 psi.

14. The process defined in any one of the preceding
35 claims wherein the process conditions for the precipitation step (c) include operating at a liquor temperature of at least 50°C.

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15. The process defined in claim 14 wherein the liquor temperature is at least 60°C.

16. The process defined in any one of the preceding
5 claims wherein the seed particles for the precipitation step (c) have a particle size of P_{50} less than 100 micron.

17. The process defined in claim 16 wherein the
10 particle size of the seed particles is P_{50} less than 80 micron.

18. The process defined in claim 17 wherein the
particle size of the seed particles be P_{50} less than 60
15 micron.

19. The process defined in any one of claims 16 to 18
wherein the seed particle concentration for the
precipitation step (c) is greater than 30g/l.

20. 20. The process defined in claim 17 wherein the seed
particle concentration is greater than 40g/l.

21. The process defined in any one of the preceding
claims wherein the ratio of iron and the valuable metal in
25 the leach liquor supplied to step (a) is greater than 2:1.

22. The process defined in claim 21 wherein the ratio
is greater than 3:1.

30 23. The process defined in claim 22 wherein the ratio
is greater than 5:1.

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